Seminar

Institute for Plasma Research

Title : Study of plasma in a versatile multi-pole cusp magnetic field

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Date : 21st June 2019 (Friday)

Time : 11:00 A.M.

Venue : Seminar Hall, IPR

Abstract :

Multi-pole line-cusp magnetic field configuration can confine dense and uniform plasma in a large volume compared to other peer configurations. Because of these properties cusp confined plasmas have found wide applications *viz.* basic plasma studies, plasma ion thrusters, ion sources etc. But the optimization of the configuration needs more fundamental studies. In this line, a new multi-pole line cusp configured plasma device (MPD) consisting of six electromagnets has been constructed with versatile magnetic field options. In this device, filamentary plasma has been produced using argon gas to study the basic characteristics. It is expected that, in this set up the desired gradients in the plasma density and temperature can be obtained by varying the current in the magnets. Basic characterisation of the argon plasma thus produced has been completed. A reasonable volume of quiescent plasma has been identified in the centre surrounded by a slightly agitating (fluctuating) plasma at the edge region. The cusp leak-width has been calculated for MPD for different magnetic field values and has been verified with the already published results. The particle confinement estimated from the after-glow plasma is found to be increasing with magnetic field. The profiles of the plasma parameters have been measured using electrical probe diagnostic. The variation in the density and potential fluctuations with respect to the magnetic field have been studied in detail. The fluctuations in the edge region are found to be originating from density gradient driven drift wave instabilities. This has been verified by studying the scale length of plasma parameters, frequency spectra, cross-correlation functions, and their normalized fluctuation levels.